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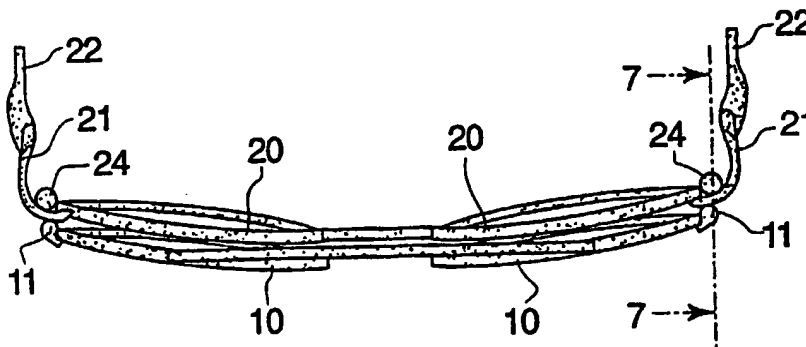
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- (71) Applicant (for all designated States except US): CHIC OPTIC, INC [CA/CA]; P.O. Box 1799, Terminal A, Montreal H3C 3A5 (CA).
- (72) Inventors; and
- (75) Inventors/Applicants (for US only): IFERGAN, Thierry [CA/US]; 20805 NE 30th Place, Aventura, FL 33180 (US). SAM, Jean-Pierre [CA/CA]; 146 Meridian Boulevard, Kirkland, Quebec H9H 4B3 (CA).
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(54) Title: EYEGGLASS DEVICE



(57) Abstract: An eyeglass device comprised of a primary eyeglass frame (20) and an auxiliary eyeglass frame (10), each containing lenses therein. The primary eyeglass frame (20) includes a bridge (25) and earpieces, which are connected to extensions (21) on each side of the frame. The bridge may be made of a flexible memory alloy such as NiTi or CuAlBe. The extensions (21) have magnets mounted on the undersides of them. The auxiliary eyeglass frame (10) also includes a bridge (13) and temporal extensions (11). These extensions of the auxiliary eyeglass frame have magnets mounted to the tops of them. The magnets engage magnetically with each other to connect the auxiliary eyeglass frame to the primary eyeglass frame. The flexible bridges of the primary and auxiliary eyeglass frames assist in preventing the auxiliary eyeglass frame in case it jostled by the wearer because they can withstand slight distortion.

EYEGLOSS DEVICE

FIELD OF THE INVENTION

5 The present invention relates to an eyeglass device comprising auxiliary eyeglasses, which are attached to primary eyeglasses by magnetic or mechanical engagement.

BACKGROUND OF THE INVENTION

 With eyeglass clips which are attached by means of conventional attachments, the
10 clips may become disengaged by torsion. As the frame is twisted or turned in any axial, radial or other direction, the clips will become dislodged from the primary frame, thus falling off or, at a minimum, becoming out of alignment and perhaps partially disconnected from the primary frame. To address this problem the rigidity of the primary frame must therefore be balanced, so as not to deform too much when subjected to
15 various types of torsion. This has been true of primary frames used in association with both of magnetic and non-magnetic auxiliary frames. Today, frames are commonly manufactured with more flexible materials.

 Another alternative has been to have an auxiliary eyeglass frame made out of extremely flexible material. However, auxiliary frame of this type have the disadvantage

of being very fragile.

Various types of auxiliary eyeglass frames which contain magnetic material to facilitate adhesion to the primary eyeglass frame have been disclosed in the prior art.

U.S. Patent No. 4,070,103 discloses an eyeglass frame in which the peripheral edges of
5 the primary frame and lens rim covers contain magnetic strips to hold the lens rim cover in place on the primary frame. U.S. Patent No. 5,416,537 discloses an eyeglass frame which contains magnetic members on the temple of the primary frame which engage a corresponding magnetic member on the temple of the auxiliary frame. U.S. Patent No. 5,642,177 discloses an auxiliary eyeglass frame which uses the same principle of
10 magnets on the temporal portions as U.S. Patent No. 5,416,537; however the auxiliary frame disclosed in U.S. Patent No. 5,642,177 contains a hinge on the bridge of the frame which allows it to be folded. U.S. Patent No. 5,568,207 discloses an auxiliary frame which contains small extensions on the temporal portions of the frame which secure the auxiliary frame to the primary eyeglass frame in addition to using the principle of
15 magnetic members as disclosed in U.S. Patent No. 5,416,537. U.S. Patent 6,012,811 discloses an auxiliary eyeglass frame in which the bridge includes a U-shaped structure having two arms on the top and bottom of the bridge, respectively, with magnets located in respective arms, and the bridge of the primary frame, including its magnetic member, is sandwiched between the two arms.

20 There are many disadvantages to the eyeglasses described above. The auxiliary eyeglass frame described in U.S. Patent No. 4,070,103 requires magnetic strips on both the primary and auxiliary frames. The auxiliary eyeglass frame described in U.S. Patent No. 5,416,537 has the magnets attaching at the top of the primary frame, thus requiring the wearer to be extraordinarily precise in placing the auxiliary frame on the primary

frame. The auxiliary eyeglass frame disclosed in U.S. Patent No. 5,642,177 has front mounted magnets, which may cause the auxiliary frame to separate from the primary frame if jostled by the wearer.

Canadian patent 2,235,798, Canadian application 2,258,142, and U.S. patent 5,894,335 provide other examples of mechanical and /or magnetic attachment of auxiliary and primary frames.

SUMMARY AND OBJECTS OF THE INVENTION

The primary objective of this present invention is to provide an auxiliary eyeglass frame which securely attaches to a primary eyeglass frame by magnets.

10 This objective is achieved by a primary and auxiliary eyeglass frame combination comprised of a auxiliary eyeglass frame and a primary eyeglass frame, each containing separate lenses therein. The auxiliary eyeglass frame includes two side portions which are connected by a bridge. Each side portion of the frame has a temporal extension with magnets mounted, preferably, on a top of each extension. The primary eyeglass frame 15 also includes two side portions which are connected by a bridge. The bridges of both the primary and auxiliary frames may be made of a flexible memory alloy, such as NiTi, or CuAlBe similar to that disclosed in U.S patent 5,640,217, so that the bridges are more deformable than other parts of the frames. Each side portion has a temporal extension to which temporal members, providing earpieces, are connected. Each temporal extension 20 also has a magnet mounted, preferably, on an underside of the extension. The auxiliary eyeglass frame is secured to the primary eyeglass frame by the magnetic force between the bottom mounted magnets on the primary frame's temporal extensions and the top mounted magnets on the auxiliary frame's temporal extensions. If the bridge of either the

primary or auxiliary frame is made of a flexible shape memory alloy, such as NiTi or CuAlBe, it would be less likely that the auxiliary frame will become dislodged if jostled by the wearer because both frames would be able to withstand slight deformation. In other words, a relatively flexible portion linking two more rigid frame parts could deform to absorb an impact on one frame part, preventing the shock being transmitted to the other frame part.

According to another aspect of the invention, magnets may be mounted on one or both frames at any suitable location, such as on one or both bridges, for example, and one or more other, possibly adjacent, locations of one or both frames (where a magnet is not mounted, for example, the temporal extensions or temples), may be made of a flexible shape memory alloy or other suitable flexible material.

Magnetic engagement of primary and auxiliary frame parts may be obtained by provision of cooperating permanent magnets on both frame parts, or by a permanent magnet on only one frame part with a cooperating portion of the other frame part being made of magnetic material functioning as a temporary magnet.

The primary and auxiliary frames may rely for attachment together on magnetic engagement alone, or such magnetic engagement may be supplemented or replaced by mechanical engagement provided, for example, by suitably located clips, pins and sockets or other suitable releasable fastenings, as described in any of the references referred to above, the disclosures of which are incorporated herein by reference.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of this disclosure. For a better understanding of the invention, its operating advantages and specific objects attained by its uses, reference is made to the accompanying drawings and descriptive

matter in which preferred embodiments of the invention are illustrated.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

Fig. 1 is a front of the auxiliary eyeglass frame of the present invention;

5 Fig. 2 is a front view of a pair of primary eyeglass frames;

Fig. 3 is a top view of the auxiliary eyeglass frame;

Fig. 4 is a top view of the primary frame with nosepieces omitted;

Fig. 5 is a front view of the primary and auxiliary frame combination;

10 Fig. 6 is a top view of the primary and auxiliary frame combination with
nosepieces omitted;

Fig. 7 is a cross sectional view taken along lines 7-7 of Fig. 6 showing the
positioning of the magnetic attachment between the primary and auxiliary frames;

Fig. 8 is a top view of a primary eyeglass frame according to a second
embodiment wherein a portion of each temple member extending for only part of the
15 temporal region is formed from flexible shape memory alloy to provide a relatively
flexible link;

Fig. 9 is a top view of a primary and auxiliary eyeglass frame combination
according to another embodiment of the invention wherein a portion of the temple
members formed from flexible shape memory alloy extends for substantially the entire
20 the temporal region; and

Figure 10 is a top view of the primary frame of the embodiment shown in Fig. 9.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings, and in particular Figs. 1-4, a primary and auxiliary frame combination in accordance with the present invention is comprised of a auxiliary eyeglass frame 10 containing a first set of lenses therein and an primary eyeglass frame 20 containing a second set of lenses therein. The auxiliary eyeglass frame 10 includes a bridge 13 and temporal extension 11 on each side. Each temporal extension 11 contains a magnet 12 mounted at a top of the extension 11 in an upwardly protruding through-socket 16 formed at a free end of the extension 11, as shown in Fig. 6. The primary eyeglass frame 20 includes two side portions each having a temporal region with temporal extension 21 to which the temporal members 22, for engaging a wearer's head or ears, are pivotally connected. The primary eyeglass frame 21 also includes a bridge 25. Each temporal extension 21 contains a magnet 24 mounted to the bottom of the extension 21 in a through-socket 23. The bridges 25 and 13 of the primary frame and the auxiliary frame, respectively, are made of a flexible shape memory alloy, such as NiTi or CuAlBe, providing a relatively flexible or deformable link.

As seen in Figs. 5 and 6, the auxiliary eyeglass frame 10 is secured in front of the primary eyeglass frame 20 by the magnetic force between magnets 12 and 24. As a result, the auxiliary eyeglass frame 10 is securely mounted from the underside with the second temporal extensions underneath respective first temporal extensions and will not easily be disengaged from the primary eyeglass frame 20. It should be noted that magnets 12 and 24 are not embedded in the temporal extensions 11 and 21. Thus, the temporal extensions are not hollow and are less likely to break.

Fig. 7 shows the magnetic engagement between the magnets 12 and 24. The

temporal extensions are in contact with each other and there is a slight gap between the magnets 12 and 24 with magnet 12 aligned underneath magnet 24. Magnet 12 is slightly recessed into the through-socket 15 of the temporal extension 11, while magnet 24 is mounted flush to the temporal extension. In an alternative embodiment, magnet 12 may
5 be mounted flush to the top of the through-socket 15 of the temporal extension 11 and magnet 24, whilst mounted to the bottom of the temporal extension 21 may be slightly recessed into the through-socket 26 of the temporal extension 21. Thus, the magnets do not come directly into contact with one another, but are close enough to still be attracted. The advantage of not having the magnets come into direct contact is that it prevents them
10 from becoming damaged.

In the second embodiment shown in Fig 8, each temple member 22' has a linking portion 31 which is formed from flexible shape memory alloy and extends rearward from a hinge portion 32 for only part of the temporal region, providing a relatively flexible link. Each stem portion 31 is connected to a rearward portion of the temple member and
15 to the hinge portion 32 by receipt and bonding by adhesive or solder in sockets 33 and 34 formed in the rearward portion of the temple member and in the hinge portion, respectively. Permanent magnets 24' (or suitable mechanical fasteners) are mounted on the temporal extensions 21'.

In the embodiment of Fig 9 and 10, a portion 31' of each temple members 22' formed from flexible shape memory alloy extends for substantially the entire temporal
20 region. Permanent magnets 24'' and 12'' are mounted on the bridge portions of both the primary and auxiliary frames.

While specific embodiments of the invention have been shown and described in detail to illustrate the application of the principles of the invention, it will be understood

that the invention may be embodied otherwise without departing from such principles.

WHAT IS CLAIMED IS:

1. An eyeglass device comprising:

two temporal members,

a primary eyeglass frame having means for holding a first set of lenses therein,

5 said primary eyeglass frame including a first bridge, two first side portions, each having a first temporal extension for connecting to a temporal member for retaining the primary frame on a user, each said first temporal extension including a first magnet attached to a bottom thereof,

10 an auxiliary eyeglass frame having means for holding a second set of lenses therein, said auxiliary eyeglass frame including a second bridge, two second side portions, each having a second temporal extension, each said second temporal extension including a second magnet attached to a top thereof,

15 wherein the first magnets attached to respective bottoms of the first temporal extensions magnetically engage respective second magnets attached to respective tops of said second temporal extension in overlying relation so as to secure said auxiliary eyeglass frame to said primary eyeglass frame.

2. An eyeglass device according to claim 1 wherein at least one of said first bridge and said second bridge is comprised of a flexible shape memory alloy.

20 3. An eyeglass device according to claim 2 wherein said flexible shape memory alloy is one of NiTi and CuAlBe.

4. An eyeglass device comprising:

a primary eyeglass frame having means for holding a first set of lenses therein and including two first side portions each having a first temporal extension for connecting to a temporal member, each said first side portion carrying a first magnet,

an auxiliary eyeglass frame having means for holding a second set of lenses therein and two second side portions, each having a second temporal extension carrying a second magnet,

wherein the first magnets carried by respective first side portions magnetically engage respective second magnets carried by respective second temporal extensions with the second temporal extensions extending underneath respective first temporal extensions, securing said auxiliary eyeglass frame to said primary eyeglass frame with the second set of lenses aligned with the first set of lenses.

5. An eyeglass device according to claim 4 wherein said primary eyeglass frame includes a first bridge comprised of a flexible shape memory alloy, and said auxiliary eyeglass frame includes a second bridge comprised of a flexible shape memory alloy.

6. An eyeglass device according to claim 5 wherein said flexible shape memory alloy of said first bridge is one of NiTi and CuAlBe, and said flexible shape memory alloy of said second bridge is one of NiTi and CuAlBe.

7. An eyeglass device according to claim 4 wherein respective second magnets are underneath respective first magnets.

8. An auxiliary eyeglass device adapted to be stably supported by a primary eyeglass device which includes frame means for holding a primary set of lenses therein and two primary side portions each carrying a primary magnet, the
5 auxiliary eyeglass device comprising:

means for holding an auxiliary set of lenses therein and two auxiliary side portions, each having a rearward temporal extension carrying an auxiliary magnet, wherein respective auxiliary magnets can be aligned underneath
10 respective primary magnets in magnetic engagement therewith to inhibit relative movement between said auxiliary eyeglass device and said primary eyeglass device frame means.

9. An eyeglass device according to claim 8 wherein said auxiliary eyeglass device includes a frame with first bridge comprised of a flexible shape memory alloy.
15

10. An eyeglass device comprising:

a primary eyeglass frame having means for holding a primary set of lenses, and temporal members connected at spaced locations to said primary frame, and operable to retain said primary frame on a user;

20 an auxiliary eyeglass frame having means for holding an auxiliary set of lenses therein and adapted to be positioned in front of said primary lenses, at least one

portion of the auxiliary eyeglass frame and at least one portion of the primary eyeglass frame having releasable engagement means interengageable to inhibit relative movement between the frames, at least one other portion of one of the auxiliary eyeglass frame and primary eyeglass frame being comprised of a flexible material.

11. An eyeglass device according to claim 10 wherein said flexible material is a shape memory alloy.

12. An eyeglass device according to claim 11 wherein said flexible shape memory alloy is one of NiTi and CuAlBe.

13. An eyeglass device according to claim 10 wherein said releasable engagement means comprises magnetic means for magnetic interengagement of said at least one portion of the primary frame with said at least one portion of the secondary frame.

14. An eyeglass device according to claim 13 wherein the magnetic means on said secondary frame engages under magnetic means on the primary frame.

15. An eyeglass device according to claim 11 wherein said releasable engagement means comprises magnetic means for magnetic interengagement of said at least one portion of the primary frame with said at least one portion of the secondary frame.

16. An eyeglass device according to claim 10 wherein said at least one portion of said primary eyeglass frame and said at least one portion of said auxiliary eyeglass frame are in respective temporal regions and said at least one other portion of said auxiliary eyeglass frame and said primary eyeglass frame is a bridge.

17. An eyeglass device according to claim 16 wherein said at least one portion of said primary eyeglass frame and said at least one portion of said auxiliary eyeglass frame is a temporal extension.

18. An eyeglass device according to claim 13 wherein said at least one portion of said auxiliary eyeglass frame is a temporal extension and said at least one other portion of said auxiliary eyeglass frame is a bridge.

19. An eyeglass device according to claim 10 wherein said at least one portion of said primary eyeglass frame and said at least one portion of said auxiliary eyeglass frame are in respective temporal regions and said at least one other portion of said auxiliary eyeglass frame and said primary eyeglass frame are in respective temporal regions and form a portion of a temple member.

20. An eyeglass device according to claim 10 wherein said at least one portion of said primary eyeglass frame and said at least one portion of said auxiliary eyeglass frame are bridges of respective frames and said at least one other portion of said auxiliary eyeglass frame and said primary eyeglass frame form a portion

of a temple member and extend rearwardly from a hinge to an earpiece .

21. An eyeglass device according to claim 11 wherein said at least one portion of said auxiliary eyeglass frame is a temporal extension and said at least one other portion of said auxiliary eyeglass frame is a bridge.

5 22. An auxiliary eyeglass device adapted to be stably supported by a primary eyeglass device which includes a primary frame for holding a primary set of lenses therein and temporal members connected at spaced locations to said primary frame, and operable to retain said primary frame means on a user; the auxiliary eyeglass device comprising:

10 an auxiliary frame for holding an auxiliary set of lenses therein adapted to be positioned in front of said primary set of lenses, at least one portion of the auxiliary frame having means for releasably engaging one portion of the primary frame to inhibit relative movement between the frames, at least one other portion of one of the auxiliary frame and primary frame being comprised of a flexible material.

15 23. An eyeglass device according to claim 22 wherein said flexible material is a shape memory alloy.

24. An eyeglass device according to claim 23 wherein said flexible memory alloy is one of NiTi and CuAlBe.

20 25. An eyeglass device according to claim 24 wherein said releasable means comprises a magnetic member for magnetically engaging said portion of the primary frame.

Fig. 1

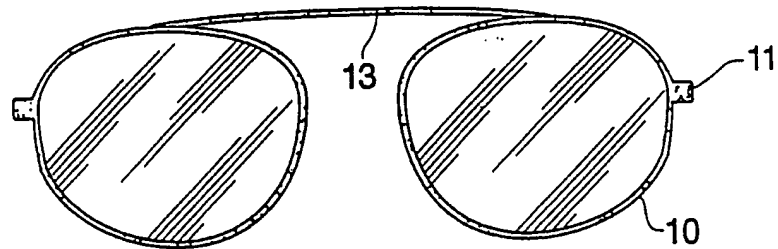


Fig. 2

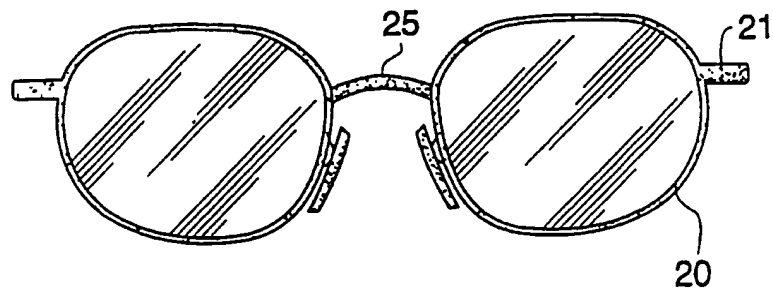


Fig. 3

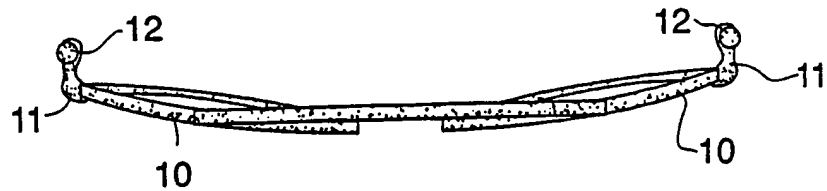


Fig. 4



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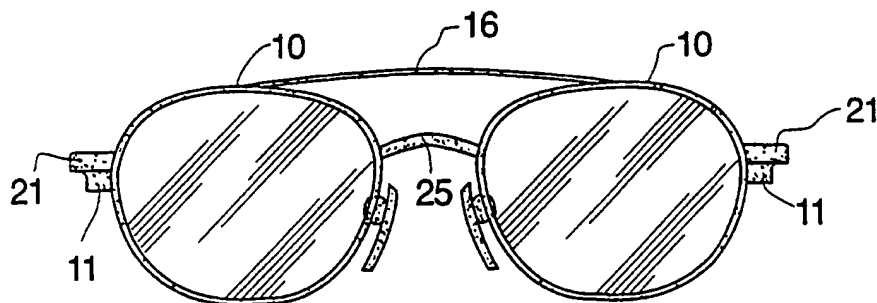


Fig. 5

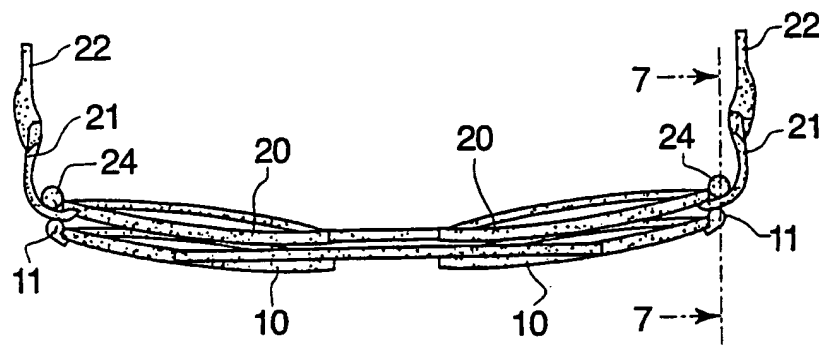


Fig. 6

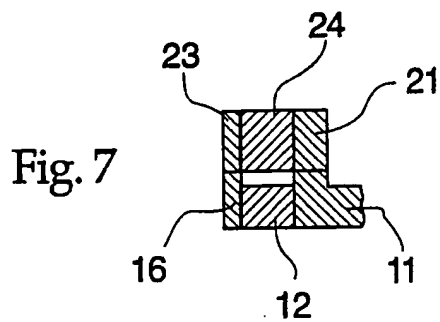


Fig. 7

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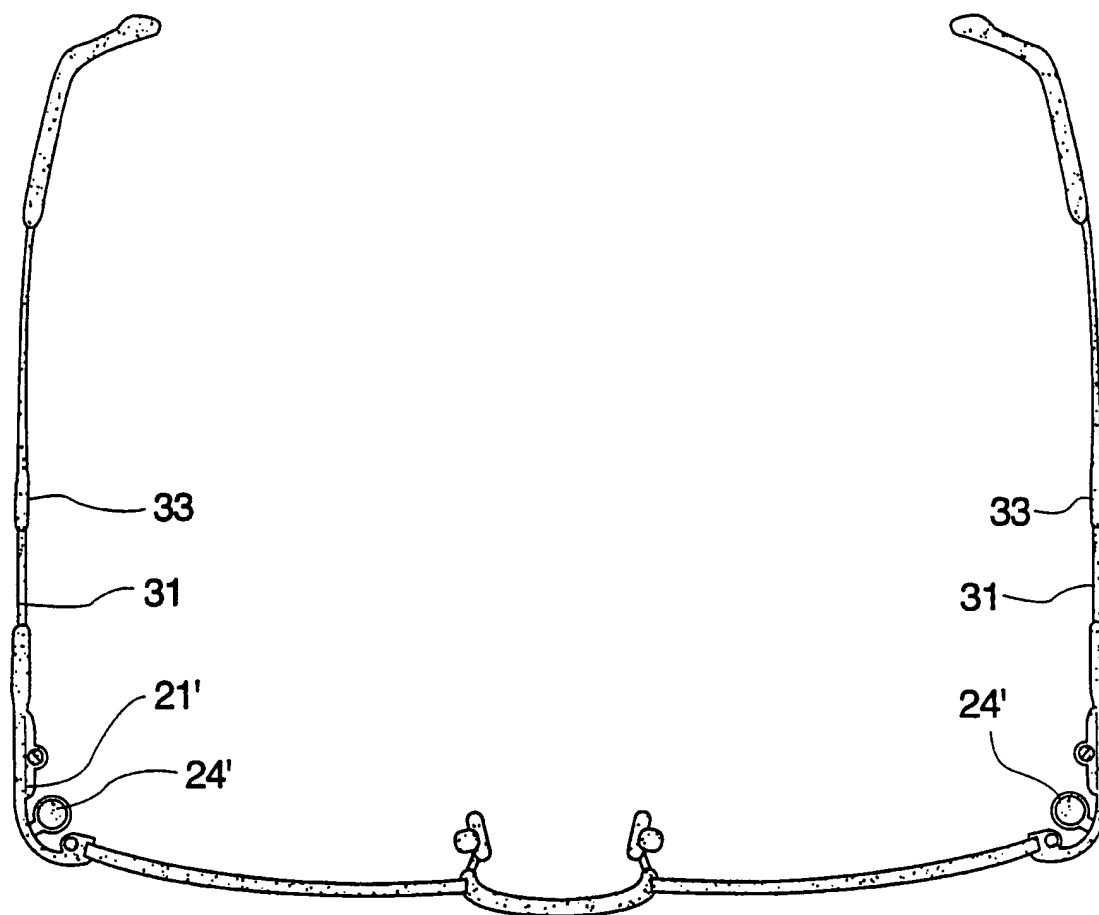


Fig. 8

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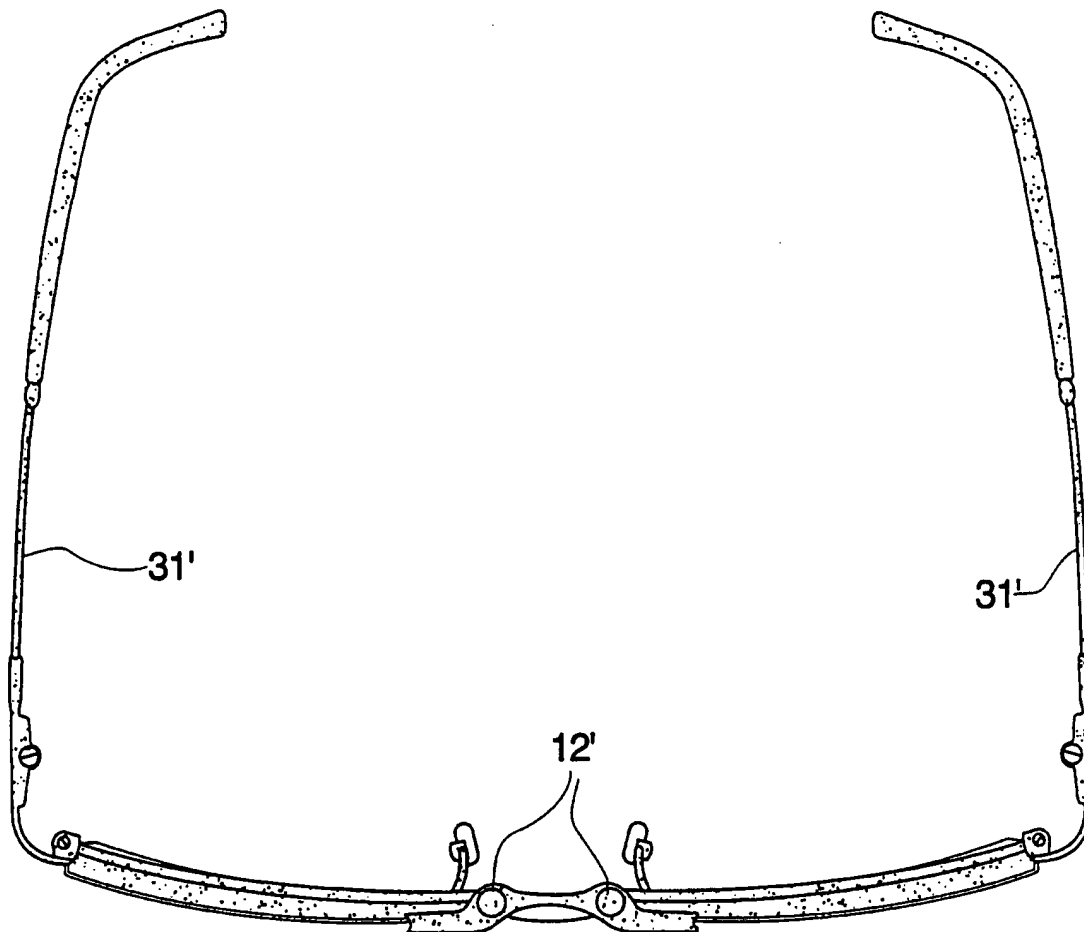


Fig. 9

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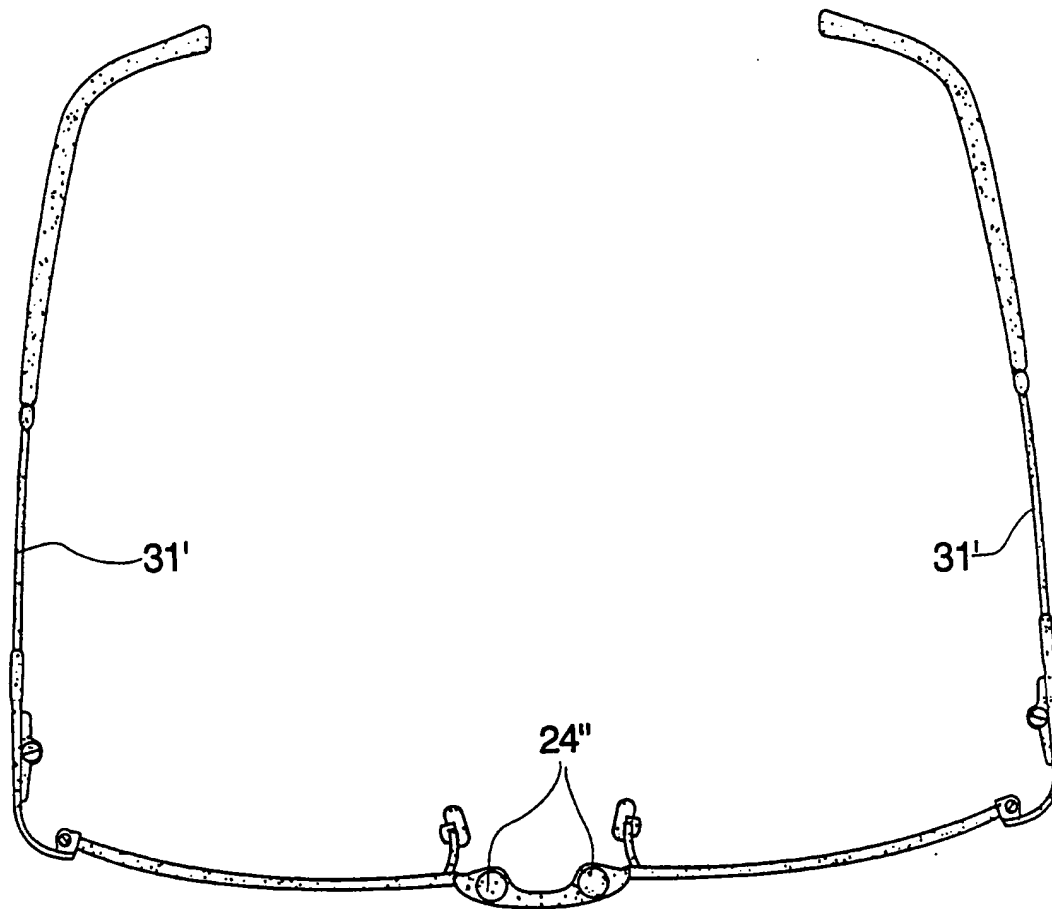


Fig. 10

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/US00/26356

A. CLASSIFICATION OF SUBJECT MATTER

IPC(7) :G02C 9/00, 7/08, 5/06

US CL :351/47, 57, 124, 126

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 351/47, 57, 124, 126

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EAST

search terms: eyeglasses, spectacles, goggles, snglasses, magnet\$, shape memory alloy

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5,568,207 A (CHAO) 22 October 1996 (22.10.96), see entire document.	1,4,7,8,13-22,25
X	US 5,940,162 A (WONG) 17 August 1999 (17.08.99), see entire document.	1,4,7,8,13-22,25
X	US 5,431,506 A (MASUNAGA) 11 July 1995 (11.07.95), See entire document.	1-6, 8-12, 22-24

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance: the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"E" earlier document published on or after the international filing date	"Y" document of particular relevance: the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"&" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

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Name and mailing address of the ISA/US
Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

HUY KXMAI

Telephone No. (703) 308-4674

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